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CHANGING FOREST LAND USE FOR AGRICULTURE AND LIVELIHOOD IN NORTH EAST INDIA

Reimeingam Marchang*

Abstract

Forest land cover in the mountainous North Eastern Region (NER) is slowly improving with the decline of the area of land under shifting cultivation. Forest land cover improvement is expected to accelerate further with the effective implementation of the National Forest Policy 2018. Forest land in general and shifting cultivation, in particular, remains the primary means of livelihood for many ST people. Forest land cover is slowly increasing as the dependence on it for agriculture and livelihood declines, primarily owing to the gradual abandonment of the practise of shifting cultivation by the then shifting cultivators. These then shifting cultivators did not allow others to cultivate their land, thereby causing a decline in the area of cultivated land under shifting cultivation. Rapid population growth has led to the increase of the number of people and families depending on shifting cultivation in their limited land. The decline of the area under it and the increase of people depending on it led to an increase of pressure of population on agricultural land, thereby reducing the average size of cultivated area per family. The livelihood condition of shifting cultivators is still underdeveloped, and they cultivate a small size of land that rendered a subsistence economy. Shifting cultivation continues to prevail as the means of livelihood of ST people. However, it is not so predominant and declining in terms of area under it owing to a steady shift, transformation and withdrawal, particularly from labour-intensive shifting cultivation to non-agricultural livelihoods.

Keywords: Forest, land use, shifting cultivation, Scheduled Tribes, livelihood, North Eastern Region.

Introduction

The North Eastern Region (NER)[1] covers about eight per cent of India's geographical areas. Close to one-fourth of India's forest cover is in the region. The forest cover has slightly improved owing to re-vegetation and afforestation (Marchang, 2017a), and conservation, re-growth of shifting cultivation area, regeneration of bamboo and other plantations (Forest Survey of India, FSI, 2017) and is expected to accelerate further with effective implementation of the National Forest Policy (2018). Forest cover was much greater in the region than in India. The land including forest land is utilised for agriculture (Directorate of Economics and Statistics, 2017). For Scheduled Tribes (STs)[2] land and forest is an integral part of the livelihood (Nongbri, 1999); however, the land is largely owned by the community (Sachchidananda, 1989; Ray, 1991; Shimray, 2008; Marchang, 2017b).

ST people living in the forest, hill and rough terrain of North East (NE) depend on land and forest resources for their livelihood through agriculture, food gathering and hunting (Roy, 1989; Nongbri, 1999; MTA, 2013). They are underdeveloped and marginalised (Roy, 1989; Sundaram and Tendulkar, 2003; Srivastava, 2008; MTA, 2013; Bhagat, 2013) despite the introduction of various development strategies (Goswami, 1984; Sengupta, 1988; Bezbaruah, 2007). They primarily practise shifting cultivation for livelihood (Christoph, 1982; Thangchungnunga, 1987; Kumar & Ramakrishnan,

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1990; Saikia, 1991; Nongbri, 1999; Sundaram and Tendulkar, 2003; Shimray, 2004; Sengupta, 2013; Marchang, 2016, 2017a & 2017b). But all ST do not practise it (Corbridge, 1988; Marchang, 2017b); and its income is self-subsistence (Das, 2006; Marchang, 2017a & 2017b). Rapid population growth and land scarcity have reduced the shifting cultivation cycle (Ninan, 1992; Jarosz, 1993; Debbarma, 2008; Menon, 2008; Marchang, 2017a & 2017b) affecting productivity and income. The practice of shifting cultivation continues despite government programmes to control shifting cultivation (Kumar, 1987; Maithani, 1991). The livelihood system of ST people has undergone a change (Singh, 1988; Nongbri, 1999; Sengupta, 2013; Marchang, 2016 & 2019) and led to their relinquishing agriculture and dependence on forest resources.

With this backdrop, the current paper examines the changing pattern of forest land, land use for agriculture, shifting cultivation and livelihood condition of STs of NER, comparing it with the country's scenario. The study is based on secondary data and literature such as the Forest Survey of India (FSI), Land Use Statistics, Directorate of Economics and Statistics (DES) and other related agricultural data sources to examine the changing pattern of forest land and land use for agriculture, forest land use for shifting cultivation and livelihood condition for STs of NER.

Forest Land

NER covers about eight per cent of India's geographical areas. According to the FSI data, 26.4 per cent of the total forest cover of India was in the region in 1991; that has slightly declined to 25.1 per cent in 2001, and further a decade later in 2011, the forest cover marginally declined to 25.0 per cent, and later in 2017, it has declined to 24.2 per cent. Thus, NER's forest cover contribution to the country has shown a systematic and gradual decline. It is owing to a systematic decline of NER's open forest areas in the country. However, most importantly, forest cover grows in absolute terms (see Table 1); it grows slower in the region (1.5 per cent during 1991-2017) than in the country (10.8 per cent during the same period) resulting in a drop in the share. The share of open forest land area of the region in the country has declined from 30.6 per cent in 1991 to 26.3 per cent in 2001 which further declines to 24.7 per cent in 2011, that further declines to as low as 22.9 per cent in 2017. During these periods, the dense forest cover including both very and moderately dense forests in the region has slightly improved. In the sense that the proportion of dense forest contribution to the country has increased from 23.6 per cent in 1991 to 24.3 per cent in 2001, further increased to 25.3 per cent in 2011; however, it very marginally declined to 25.2 per cent in 2017. Its improvement for the region surpasses the country level of improvement. For example, dense forest area has grown by 12.4 per cent from 91036 km^2 in 1991 to 102338 km^2 in 2017 for NER; whereas it has grown by only 5.6 per cent from 385008 km^2 in 1991 to 406476 km^2 in 2017 for the country. It implies that dense forest areas have improved more significantly in the region, despite the wide practice of shifting cultivation, than in the country as a whole. Assam the second largest state among the NE states has the least forest cover area (Marchang, 2016).

FSI (1987) has defined a dense forest as all lands covered with trees of the crown density of above 40 per cent and open as crown density between 10 and 40 per cent. A scrub forest is defined as one with trees of a crown density below 10 per cent. Before 2005, dense forest was not subdivided into

very or moderately dense. FSI (2017) like FSI (2005) classified forest into the very dense forest – all lands with tree canopy density of 70 per cent and above, moderately dense forest – all lands with tree canopy density of 40 per cent and more but less than 70 per cent, and open forest – all lands with tree canopy density of 10 per cent or more but less than 40 per cent. Besides these, a scrub forest was classified as degraded forest land with a canopy density of less than 10 per cent. Canopy density is the percentage area of land covered by the tree canopy – a cover of branches and foliage formed by the crowns of trees, of trees.

Forest cover shows a slight improvement in the region as well as in the country as presented in Table 1. NER has a forest cover of more than three times that of the country. In NER, forest cover has improved marginally from 64.4 per cent in 1991 to 65.3 per cent in 2017 in the geographical area due to the improvement of dense forest as a result of forest conservation and rejuvenation. It is expected to accelerate forest area growth further with the effective implementation of the National Forest Policy (2018). The policy envisages increasing forest cover by safeguarding the ecological and livelihood security of people based on sustainable forest management (Ministry of Environment, Forest and Climate Change, 2018). However, the National Forest Policy (2018) does not address the problem of forest rights of marginal and tribal forest dwellers that are otherwise safeguarded by the Forest Right Act (2006) for individual rights over forest land cultivation for livelihoods and community rights over common forest resources. The Forest Rights Act (2006) guarantees individual rights over forest land cultivation for livelihoods and community rights over common forest resources for dwelling, livelihood, protect, regenerate, conserve or manage the resources (MTA and UNDP, 2014). The slow improvement of forest cover, despite relinquishing of dependence over forests for livelihood, is owing to an extension of human settlement, developmental activities like road or dam construction, and practice of shifting cultivation that affects the land rejuvenation and re-vegetation process (Marchang, 2017a). The share of very dense forests has also improved marginally; however, it is much smaller than that of moderately dense forests. Nevertheless, the region continues to have a considerably larger share of dense forests as well as open forest areas when compared to the country's level.

Table 1: Distribution (%) of Various Types of Forest Areas in Geographical Areas of NER/India

Region/ country	Year	Total geographical area (km^2)	Total forest cover (km^2)	Total forest cover	Very dense forest	Moderately dense forest	Total dense forest	Open forest
NER	1991	262179	168810	64.4	NA	NA	34.7 (53.9)	29.7 (46.1)
	2001	262179	169368	64.6	NA	NA	38.7 (59.8)	25.9 (40.2)
	2011	262179	173219	66.1	9.7 (14.7)	29.3 (44.3)	39.0 (59.0)	27.1 (41.0)
	2017	262179	171306	65.3	10.7 (16.4)	28.3 (43.4)	39.0 (59.7)	26.3 (40.3)
India	1991	3287263	639182	19.4	NA	NA	11.7 (60.2)	7.7 (39.8)
	2001	3287263	675538	20.6	NA	NA	12.7 (61.7)	7.9 (38.3)
	2011	3287263	692027	21.1	2.5 (12.1)	9.8 (46.3)	12.3 (58.4)	8.8 (41.6)
	2017	3287263	708273	21.5	3.0 (13.9)	9.4 (43.5)	12.4 (57.4)	9.2 (42.6)

Note: NA – not available. Figures in the parentheses are the percentage distribution of forest types.

Source: FSI (various years).

Forest conditions are constantly altered by human intervention into the forest area for development or livelihood purposes. In NER, contrary to the country's trend, the dense forest cover has improved from 53.9 per cent in 1991 to 59.7 per cent in 2017 due to the decline in open forests. The dense forests are largely contributed by the moderately dense forests. Their improvement is attributed to the decline in dependence on forest resource for livelihood or shifting cultivation. The improvement of dense forest cover is owing to re-vegetation and afforestation in the open forests (Marchang, 2017a). NER always and increasingly has a greater cover with very dense forests when compared to forest cover in the rest of the country.

The change in the forest vegetation area mainly relates to the nature and intensity of forest exploitation. According to FSI (2017) the reasons for such changes, although not uniform across the NE states, in the region are practice of shifting cultivation, developmental activities, plantation activities, rotational felling in a tea garden, conservation, re-growth of shifting cultivation area, regeneration of bamboo, other plantations, harvesting of rubber plantations, and extension of the area under rubber plantations. Some of these reasons such as shifting cultivation that degrades and deforests relate to some major forest issues in the region. Deforestation and degradation of forest land and forest management challenges such as indigenous people enjoying their traditional or customary rights or privileges on land, lack of institutional support to communities and others are major issues of forests (Sastry et al., 2007). Moreover, deforestation is caused by an expansion of the residential areas, forest conversion for permanent pasture and agriculture, intensive shifting cultivation, infrastructure expansion and alike, and forest degradation owing to selective logging, shifting cultivation, mining and deterioration of rejuvenation processes among others (Marchang, 2017a).

Table 2: Share (%) of Type of Forests in NER

Year	Total geographical area (GA) (km^2)	Recorded forests (km^2)	Recorded forests % GA	% to Recorded Forest Type		
				Reserved forests	Protected forests	Unclassified forests
1991	262179	140392	53.5	41.3	7.3	51.5
2001	262179	142094	54.2	40.1	6.4	53.6
2011	262179	143360	54.7	33.9	12.7	53.4
2017	262179	131552	50.2	34.5	10.9	54.6

Source: FSI (various years).

FSI (2005) defined reserved forests as an area so constituted under the provision of the Indian Forest Act or other State Forest Acts having the full degree of protection. In reserved forests, all activities are prohibited unless permitted. The protected forest is an area notified under the provisions of the Indian Forest Act or other State Forest Acts having a limited degree of protection. In the protected forest all activities are permitted unless prohibited.

As much as 53.5 per cent of the geographical areas of the region were recorded as forest areas in 1991. That has dropped to 50.2 per cent in 2017 (Table 2). Out of the recorded forest land areas, slightly less than half was classified as reserved and protected forest land. More than half of it was unclassified forest land. In the year 1991, reserved forest comprised about 41 per cent while protected forest formed about seven per cent and the rest 52 per cent constituted unclassified forests.

The structure of forest land classification has changed over time. In 2017, the share of the reserved forest has declined to 34.5 per cent. Such a decline of the reserved forest is attributed to land encroachment (Hueiyen News Service, 2011) induced by population pressure for human settlement and developmental activities (Marchang, 2017a). Whereas the shares of the protected forests has increased to around eleven per cent and the unclassified forests has improved to 54.6 per cent in 2017.

Land Use for Agriculture

Like in the rest of the country, in NER too about 94 per cent of the geographical area was identified and notified for land utilisation in 2014-15. The region was reporting a slight increase in the share of land areas for utilisation as in the country during 1990-91 to 2014-15. Lands for utilisation include forests, areas under non-agricultural uses, barren and uncultivable lands, fallow lands, other uncultivable lands and net area sown (DES, 2017). Slightly more than three per cent of India's net area sown, total cropped area and area sown more than once was in NER, against the region's geographical area contribution of eight per cent in the country. It portrays that the region has the potential to exploit the forest land, in particular, prudently for various kinds of land development for sustainable agriculture as well as other suitable developmental activities. Sustainable agriculture refers to enhancing agricultural food production without destroying the environment (Srinivas, 1996). In the development of sustainable agriculture, the three sustainable development dimensions namely environmental, economic and social are included and interrelated (Bowler, 2002).

Agricultural land has increased in terms of the net area shown as well as total cropped areas. In 2014-15, NER contributed eight per cent of India's land notified for utilisation for various purposes. In terms of cultivation areas covering both net area sown and total cropped area, the region is increasingly contributing to the country as shown in Table 3. In other words, the land was increasingly extended for agriculture that was induced by rapid population growth. However, the share of NER in terms of area sown more than once contributed in the country was low and declining. It means multiple cropping systems remain stagnant over the year. The practice of shifting cultivation that solely depends on monsoon for irrigation in most of the NE states deters the adoption of multiple cropping systems (Marchang, 2017b).

Table 3: Share (%) of land use in the geographical areas and cropping intensity in NER/India

Region/ country	Year	Geographical area (km^2)	% share to geographical areas				Cropping intensity* (%)
			Area for land utilisation	Net area sown	Total cropped area	Area sown more than once	
NER	1990/91	262179	88.6 (7.6)	14.6 (2.7)	20.6 (2.9)	6.0 (3.7)	141.3
	2001/02	262179	87.7 (7.5)	15.9 (3.0)	21.3 (3.0)	5.5 (3.0)	134.3
	2011/12	262179	94.1 (8.0)	17.1 (3.2)	24.2 (3.2)	7.1 (3.4)	141.4
	2014/15	262179	93.9 (8.0)	17.5 (3.3)	24.3 (3.2)	6.8 (3.1)	139.0
India	1990/91	3287263	92.7	43.5	56.5	13.0	129.9
	2001/02	3287263	92.8	42.8	57.2	14.4	133.6
	2011/12	3287263	93.5	42.9	59.6	16.7	138.9
	2014/15	3287263	93.6	42.6	60.3	17.7	141.6

Notes: *cropping intensity = total crop area / net area shown x 100. Figures in the parentheses are NER % India.

Sources: Author's calculation based on data for 1990/91 from Land Use Statistics at a Glance (http://eands.dacnet.nic.in/LUS-1984-85.htm); 2011-12 (http://eands.dacnet.nic.in/LUS_1999_2004.htm) accessed on 13 March 2015; DES, 2017.

The shares of net area sown, total cropped area and area sown more than once in the total geographical areas of NER have almost systematically increased during the period 1990-91 to 2014-15. It is attributed to rapid population growth, and decline of soil fertility and agricultural production (Marchang, 2016, 2017a & 2017b). The share of the net area shown to the geographical area was very low in comparison with the national level. In NER in 1990-91 about 15 per cent of the geographical areas were under net area shown against around 44 per cent in the country. Later in 2014-15, the share of the net area shown rose marginally to 17.5 per cent in NER against 43 per cent for India.

In NER, the share of total cropped areas was considerably lower than the national level because of the reduced practice of multiple cropping in the region. Nevertheless, the share of total cropped areas has increased for the region following the national trend from 1990-91 to 2014-15 due to the increase of population and due to the decline of soil fertility and agricultural production. The region is inadequately producing foodgrains, namely rice the staple foods and principal crops (Sachdeva, 2000).

Moreover, the cropping intensity was considerably higher for the region (141.3 per cent) when compared to the country's level (129.9 per cent) during 1990-91. It means the region raises more crops from the same field when compared to the country during one agricultural year. Later, during 2014-15, it became slightly lower for the region (139.0 per cent) than for the country (141.6 per cent). It portrays that the region is somewhat behind the country in terms of raising the number of crops in the same agricultural land during the agricultural year. It fluctuates for the region, against a systematic increase for the country, over the periods. It has declined by about two percentage points for the region against an increase by twelve percentage points for the country. It signifies that the region has reduced, while the country has increased, the number of crops from the same agricultural field during one agricultural year.

Shifting Cultivation: System, Labour and Forest Land

In NER, ST people largely depend on land and forest for livelihood through agriculture, food gathering and hunting. Shifting cultivation or jhumming in the forest land has been practised as a way of life within the tribal communities and hill people from time immemorial (Peale, 1874; Seavoy, 1973; Eden, 1993; Gupta, 2000). Seavoy (1973:522) defined a shifting cultivation system as "clearing a patch of forest by felling and burning trees and then cultivating this land for one or more years before abandoning it in favor of other patches". Under shifting cultivation, forest is felled and the site used for up to two years only (Peale, 1874). After cropping, each patch is allowed to revert to secondary growth for some years before it is re-cleared and re-cultivated. The system is a primitive mode of agriculture but the most economical method of cultivation as it produces a huge net return (Shimray, 2004). It is characterised by a rotation of field rather than of crops, by a short period of cropping alternating with long fallow periods and by clearing through slash and burn (Ninan, 1992).

Burning under shifting cultivation reduces labour input for physical clearance; produces ash for valuable fertiliser, the leaching effect increases the availability of soil nutrients to plants and may kill fungal diseases and noxious insects (Forestry Department, 1985). The ashes produced from the burning were used as manure (DES, 2007).

Shifting cultivation is both a labour intensive and land extensive process of cultivation. It occupies a distinct place in the tribal economy and constitutes a vital part of the lifestyle and socio-economic setup in NER. The "[p]olicymakers, governments and analysts have often assumed that shifting cultivation is universally unsustainable and destructive of forests and wildlife and have failed to recognise the great variety of land-use types involved, to understand the cultural knowledge of the indigenous peoples, or to realise the vast number of plant and tree species associated with shifting cultivation" (Kerkhoff and Sharma, 2006:6). The system is practised among the indigenous people. Roy, Xavier and William (2012) noted that ILO Convention No.169 Article No.14 specifically recognised the rights of ownership and possession of the peoples concerned over the lands which they traditionally occupy including the rights of shifting cultivators. The ILO Convention No.107 safeguards the land and resource rights of the indigenous people; and its No.111 guaranteed that shifting cultivators may exercise the right to practise a traditional occupation. Additionally, the United Nations Declaration on the Rights of Indigenous Peoples recognises several rights for the indigenous communities practising shifting cultivation.

There is no comprehensive and proper data on shifting cultivation, particularly its area and production in the North East. Shifting cultivation is prominently practised for livelihood among the ST people of NER (Thangchungnunga, 1987; Prakash and Roy, 1987; Reddy, 1991; Shimray, 2004; Marchang, 2016, 2017a & 2017b). In it, they grow rice, millet, corns, taro, potato, pea, several varieties of small grain, yams, chillies, ginger, garlic, pumpkins, and other vegetables, and cotton (Godden, 1898); paddy, millets, maize, ginger, yam, oilseeds, cotton and vegetables like gourds, pumpkins, cucumbers, etc (Prakash and Roy, 1987).

In Mizoram, agriculturists generally practise shifting cultivation due to its hilly forest terrain; and, permanent cultivation is also practised in small patches of flat land (Thangchungnunga, 1987). In Manipur, permanent cultivation is mostly practised in the valley area whereas shifting and terrace

cultivations are generally practised in the hills area (DES, 2014). Forest areas are also cleared for temporary land use such as plantation as well as permanent land use such as the construction of road or terrace farming. Nagas practise both shifting cultivation as well as sedentary terraced cultivation (Shimray, 2004). Some other tribes of the NE states also practise terrace cultivation on the slope of the hills. Terrace cultivation is also practised in Naga society, but it is confined to the lower gradient of the mountain ranges and to narrow river banks and valleys.

Table 4: Profile of Shifting Cultivation in NE States/NER

Particulars	Year	Ar.P	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Sikkim	Tripura	NER
Geographical area (km^2)	2011	83743	78438	22327	22429	21081	16579	7096	10486	262179
Annual area under shifting cultivation (km^2)#	1974	920.0	696.0	600.0	760.0	616.1	735.4	--	223.0	4550.5
	1983	700.0	696.0	900.0	530.0	630.0	192.0	--	223.0	3871.0
	2003	1116.9	435.9	1119.5	627.2	1147.0	1116.6	--	284.9	5848.0
	2005/06	1025.1	160.2	752.1	291.9	1028.5	1239.1	--	89.3	4586.1
	2008/09	961.0	258.9	270.3	272.5	612.7	1515.0	--	33.2	3923.6
Annual area under shifting cultivation % Geographical Area	1974	1.1	0.9	2.7	3.4	2.9	4.4	--	2.1	1.7
	1983	0.8	0.9	4.0	2.4	3.0	1.2	--	2.1	1.5
	2003	1.3	0.6	5.0	2.8	5.4	6.7	--	2.7	2.2
	2005/06	1.2	0.2	3.4	1.3	4.9	7.5	--	0.9	1.8
	2008/09	1.2	0.3	1.2	1.2	2.9	9.1	--	0.3	1.5
Shifting cultivating families (Number in lakh)^	1974	0.81	0.58	0.50	0.68	0.45	0.80	--	0.43	4.25
	1983	0.54	0.58	0.70	0.52	0.50	1.16	--	0.43	4.43
	2001	0.47	2.27	0.47	1.22	0.56	1.13	--	0.66	6.84
	2003	0.48	2.32	0.49	1.24	0.55	1.13	--	0.67	6.96
	2006	0.50	2.40	0.52	1.27	0.54	1.14	--	0.69	7.15
	2009	0.52	2.49	0.56	1.30	0.53	1.14	--	0.70	7.35
	2011	0.54	2.54	0.58	1.31	0.53	1.15	--	0.71	7.48
	2015	0.57	2.66	0.63	1.35	0.52	1.16	--	0.74	7.76
Shifting cultivators (Number in lakh)*	2001	1.41	6.81	1.42	3.66	1.67	3.38	--	1.98	20.52
	2003	1.45	6.97	1.48	3.72	1.65	3.39	--	2.01	20.89
	2006	1.51	7.21	1.57	3.80	1.62	3.41	--	2.06	21.46
	2009	1.57	7.46	1.67	3.89	1.60	3.43	--	2.11	22.05
	2011	1.62	7.63	1.74	3.94	1.58	3.44	--	2.14	22.45
	2015	1.71	7.99	1.89	4.06	1.55	3.47	--	2.21	23.27
Average area per family (Jhum land/family) in hectares	1974	1.1	1.2	1.2	1.1	1.4	0.9	--	0.5	1.1
	1983	1.3	1.2	1.3	1.0	1.3	0.2	--	0.5	0.9
	2003	2.3	0.2	2.3	0.5	2.1	1.0	--	0.4	0.8
	2006	2.0	0.1	1.4	0.2	1.9	1.1	--	0.1	0.6
	2009	1.8	0.1	0.5	0.2	1.2	1.3	--	0.1	0.5
Fallow period (Years)	1983	3 to 10	2 to 10	4 to 7	5 to 7	3 to 4	4 to 9	--	5 to 9	4 to 8

Notes: #2003 onwards data on shifting cultivation are current jhum given in the Wasteland Atlas. ^2001 onwards data are estimated by the author using the formula 60% of the agricultural workers (main + marginal) divided by 3; assuming that there are three persons engaged in shifting cultivation per shifting cultivating

household). *Author's estimation i.e. 60 per cent of the agricultural workers i.e. cultivators and agricultural labour (main + marginal) among the ST; 2003 (t=2), 2006 (t=5), 2009 (t=8) and 2015 (t=14) figures are interpolated using population and growth rate of 2001-2011. It is assumed that 60% of the agriculturists are engaged in shifting cultivation since the system is more labour intensive than the permanent or terrace cultivation system. The 2001 figures of Manipur and NER exclude three sub-divisions, namely Mao-Maram, Paomata and Purul of Senapati district (Hills) of Manipur. Interpolated figure that is estimated using exponential growth model as follows: $P_t = P_o e^{rt}$; where P_t is the population at current year (2011), P_o is the population at previous year (2001), e is a statistical constant (2.7183), t is the desired interpolated time interval (t=2, 5, 8 and 14 years) and r is the growth rate $\{LN(P_d/P_o)/t\}$ (here t=10 years). The fallow period of 1983 of NER is the mean of lower and upper limit calculated by the Author. -- No practise of shifting cultivation.

Sources: Data for 1974 from North Eastern Council Secretariat, Shillong, 1974; For 1983 from FSI (1987) and Basic Statistics of North Eastern Region, 1995, North Eastern Council, Shillong, based on Task Force Report on Shifting Cultivation in India, MOA, New Delhi, 1983; 2000 onwards from Wasteland Atlas (http://www.dolr.nic.in); and RGCCI (2001 and 2011).

Shifting cultivation is a process involving the slashing and burning of forests. The burnt area is used for cultivation for a year and the group moves to another site in the subsequent year. Eventually, the cultivation shifts back to the old site when the area is fully re-vegetated. Ramakrishnan (1980) as cited in Shimray (2004) points out that shifting cultivation constituted the earliest form of agriculture and provided the basic needs of a person. It also placed the person in harmony with 'nature', of which the person was an integral part, and on which it depended for survival. As such the cultivation is deeply rooted and linked with indigenous ethnic culture (MEF and GBPIHED, 2009).

Shifting cultivation continues prominently in the region as shown in Table 4. Although data are not strictly comparable as different sources are being used; yet the trend of area cultivated under shifting cultivation showed an increase from the 1970s till the early 2000s for all the NE states excepting Sikkim that does not practise shifting cultivation. Later, it declined for all the NE states except for Nagaland where the area under it continues to rise and for Sikkim. In NER, in 1974 as large as 4550 km^2 of areas of land was under shifting cultivation. Later, in 2003, it rose to 5848 km^2. By 2008-09 it had dropped to about 3924 km^2. The share of areas under it in the total geographical areas was 1.7 per cent in 1974 which increased to over two per cent in 2003. Later, in 2008-09, it declined to 1.5 per cent. A similar trend prevails for all the NE states except Nagaland.

In 2008-09, the share of shifting cultivation areas in the total geographical land of Nagaland was the largest with over nine per cent, followed by Mizoram with close to three per cent. The least was in the states of Tripura and Assam. The ST population dominated NE states continue to practise it for their livelihood and source of income. The hilly topography of land which hinders the establishment of permanent agricultural wetland in the hills induces the people dwelling in the hills to practise shifting cultivation. For example, Saikia (1991) mentioned that in Nagaland, the Nagas continue to practise shifting cultivation because of the difficulties in the adoption of a suitable modern method of cultivation in the hill slopes owing to the rough hilly terrain. Thus, eradication of shifting cultivation among the STs would be difficult whose livelihood depends on it unless alternative means of livelihood is arranged, provided and secured (Marchang, 2016 & 2017b).

The number of families engaging in shifting cultivation has increased remarkably from 4.25 lakh in 1974 to 7.75 lakh (estimated) in 2015 in the region. It is important to note that the estimated figure of workers or families of shifting cultivation covers only ST population since shifting cultivation is practised mostly by STs. Many government schemes and programmes have been implemented in the past to control shifting cultivation (Maithani, 1991). Despite the implementation of programmes, the practice of it continues. The failure to fulfil the objectives of the rehabilitation of shifting cultivators shows the collapse of agricultural development in the hill areas (Marchang, 2017b). Marchang (2016) cautioned that the unemployment issue and inadequate availability of non-agricultural employment in the tribal hill area have pressed the new and surplus rural labour in shifting cultivation. It implies that shifting cultivation can be reduced by generating and delivering the non-farm jobs in construction, transportation, services etc in the hill areas. The lack of non-farm employment opportunities keeps rural labour in agriculture (Mellor, 1962).

The average shifting cultivated area size per family has reduced from 1.1 hectares in 1974 to 0.9 hectares per family in 1983 which has systematically further declined to 0.5 hectare in 2009 in the region. It implies a slow replenishment of forest land that was earlier used under shifting cultivation, scarcity of land, and rapid increase of population that led to an increase of agricultural density i.e. man-land ratio. The cultivated size of land varies from 0.5 hectare per family in Tripura to 1.4 hectares in Nagaland in 1974. Similarly, in 2003, it ranges from the lowest in Tripura with 0.4 hectare per family to the highest of 2.3 hectares in Arunachal Pradesh and Manipur. Later in 2009, again it was lowest in Tripura and Assam with a negligible area of 0.1 hectare per family and highest in Arunachal Pradesh with 1.8 hectares per family. The Tripura government has programmes for the rehabilitation of tribal shifting cultivators to engage in a rubber plantation, horticulture, animal husbandry, dairy and poultry farming (Kumar, 1987). It might have substantively lowered the average land cultivated per family in Tripura. Furthermore, per family shifting cultivated land area was relatively higher in the ST dominated states such as Arunachal Pradesh, Mizoram and Nagaland (but not Meghalaya) implying a greater dependency in shifting cultivation for their livelihood when compared to the non-ST dominated states as well as the region in 2009.

In NER, the decline of the area under shifting cultivation is most likely due to the abandonment of practice of it by the shifting cultivators, non-extension of land for shifting cultivation and non-availability of replenished forest land. Some people who have relinquished shifting cultivation practice are not permitting others to cultivate their land. On the contrary, the rapid population growth has increased the number of people and families depending on shifting cultivation. Thus, many continue to practice it in their limited land. The decline of the area under it and increase of people depending on it has led to an increase of pressure of population on agricultural land, thereby reducing the average size of cultivated area per family.

Under shifting cultivation, cultivated lands were left fallow for a certain period for forest rejuvenation, re-vegetation and soil fertility. In 1983, the fallow period ranged from four to eight years in the region as given in Table 4. The fallow periods were not uniform across the NE states. Earlier the fallow period between the two shifting cultivation cycles was considerable; that has currently reduced significantly due to the booming of population pressure. The shortening of the shifting cultivation cycle

from around 20 to 30 years to about four to five years or even less, owing to the population pressure on land and other factors are held responsible for the land degradation in areas affected by shifting cultivation (Ninan, 1992). As "population pressure increases, the shading [shifting] cycle is progressively shortened" (Seavoy, 1973:528). In Arunachal Pradesh, increasing population pressure on land has led to the shortening of the jhum cycle that raises concerns about the system's economic and ecological viability (Menon, 2008). Similarly, population pressure on shifting cultivation land has reduced to three to four years in the mid-19th century from ten years in the past in Tripura (Debbarma, 2008). Moreover, the "exponential population growth and shifting cultivation are causally linked to deforestation and environmental degradation" (Jarosz, 1993:366).

At present, under the system, the land is tilled for a year due to the decline in fertility of soil then laid fallow for some years. For instance, jhum fields are tilled for a year and deserted after the first year owing to labour constraints and/or decline in soil fertility in Nagaland (Jamir and Lianchawii, 2013). It is more convenient and economical to till a new jhum field rather than tilling for the same field for the second time in the following year. The years for lying fallow land depend on a variation on population pressure in different areas across the NE states. The fallow land period widely varies even between villages. In Mizoram, the fallow land period was 5-10 years on average but depends on the availability of land and population size (Thangchungnunga, 1987). Rapid population growth and land scarcity have reduced the shifting cultivation cycle (Jarosz, 1993; Debbarma, 2008; Marchang, 2017a & 2017b).

Changes of Livelihood

Tribal communities do have similarities, though, of broad generic ones. They are known to dwell in compact areas, follow a community way of living, in harmony with nature, and have a uniqueness of culture, distinctive customs, traditions and beliefs which are simple, direct and non-acquisitive by nature. Tribal is a way of living or a living system (Sikidar, 1990). Corbridge (1988:12) specified that "tribal societies are organized according to cultural principles". Schermerhorn (1978:70 as cited in Corbridge, 1988:10) opined that "tribes are distinguished from one another not so much by occupation (for they are much alike in this respect) as by kinship and lineage". MTA (2013) described ST using the criteria such as primitive traits, distinctive culture, geographical isolation, shyness of contact and backwardness. But even all these broad criteria do not apply to existing STs. Some of the terms used (e.g. primitive traits, backwardness) are, in the present context, pejorative and need to be replaced with terms that are not derogatory.

India has the largest indigenous and tribal population in Asia, comprised of nearly 700 State-specific STs (MTA, 2013) having quite distinct and separate languages and dialects, customs, cultural practices and lifestyles. The Census of India 2001 recorded 220 ST names excluding the generic tribes in NER. According to MTA (2013), STs have traditionally lived mainly in forests, hills, and undulating inaccessible terrain in plateau areas that have rich natural resources. They have lived as isolated entities for centuries, largely untouched by the society around them. Despite over 50 years of targeted interventions, the socio-economic development of most STs has not seen a significant improvement.

STs in India are a heterogeneous group (Chaube, 1999) and are historically a disadvantaged and economically underdeveloped people. They are largely underdeveloped due to geographical

isolation, lack of adequate infrastructure and services, illiteracy as well as ineffective policies and programmes for social upliftment. They are non-homogenous groups in economic pursuits. They have been at the "lower end in all indicators of living conditions and household assets" (Bhagat, 2013:64). STs are rural oriented, illiterate, economically backward with low income, high incidence of indebtedness and fewer assets among others and social retardation such as low status; and mostly live in inaccessible hill, forest and other deserted areas (Hanumantharayappa and Grover, 1979).

ST people do not have a traditional social hierarchy that exists in Hindu social or caste hierarchy (Sundaram and Tendulkar, 2003; Bhagat, 2013). They are, however, a marginalised class (Roy, 1989) and are relatively deprived in comparison to the non-tribal people in many aspects (Srivastava, 2008). Their social and economic underdevelopment is due to habitation in geographically isolated areas in rough terrain and practices of shifting or jhum cultivation for their livelihood (Sundaram and Tendulkar, 2003). Shifting cultivation was the major means for their livelihood (Christoph, 1982; Kunhaman, 1985; Kumar & Ramakrishnan, 1990; Nongbri, 1999; Sundaram and Tendulkar, 2003; Sengupta, 2013; Marchang 2016, 2017b & 2019). Income from shifting cultivation is self-subsistence (Das, 2006). Also, the productivity of jhum is low in comparison with the production of wetland agriculture. For example, in Tripura, jhum productivity is only 1050 kg/ha in 2014-15 (DES, 2015). It has a serious implication on the livelihood security of households solely depending on shifting cultivation. Nevertheless, shifting cultivation is not practised by all the tribes (Corbridge, 1988). Some of them practise terrace or permanent cultivation.

In NE India, the indigenous people's livelihood means is agriculture and most of them derive their income partly from cultivation and partly from gathering of forest products and engaging in other activities (Roy, 1989). For the tribals of NER, land and forest constitute an integral part of the agrarian economy (Nongbri, 1999).

In tribal areas of NER, land is largely owned by the community (Sachchidananda, 1989; Maithani, 1991; Marchang, 2017b) and as a result, incidence of landlessness is negligible (Maithani, 1991; Marchang, 2016). Thus, pressure on land is not much exerted as resources like the land are largely owned and controlled by the community. Private land ownership has also emerged (Sachchidananda, 1989; Ray, 1991; Maithani, 2005; Shimray, 2008; Debbarma, 2008; Marchang, 2017b) but limited for housing, permanent cultivation, farming etc. There is no uniform land tenure system across the tribes in the region (for details, see Marchang, 2017b).

The association of livelihood strategy in their economic setting creates a certain economic system, namely the tribal economy. The tribal economy is often associated with the denotation of the approach or discourse of livelihood practices of tribal people in terms of production, consumption, management of goods and services. There are various elements of the ideology of tribal economy namely geographical isolation, economic underdevelopment and absence of economic specialisation (poor representation in agricultural labouring, trade and industrial pursuits; poor division of labour; limited types of occupations practised); and cultural elements (Corbridge, 1988). ST people of the region live in splendid geographical isolation owing to its rugged physiographic features (Rao, 1972) that renders them difficult in accessing the social and economic development means of developed

areas. The tribal economy relates largely to an underdeveloped, subsistence, and forest-based economy (Verma, 1996; Karmakar, 2002).

Further, Singh (1988) elaborates that the tribal economy in Meghalaya has experienced commercialisation, market relations and monetisation; surplus agricultural income[3] being reinvested in agriculture; agricultural pattern changing from shifting cultivation to relatively more advanced permanent cultivation besides other changes. Tribal people have diversified their economic activities and livelihood strategy into different occupations (Corbridge, 1988; Marchang, 2016 & 2019).

The tribal livelihood system is evolving, changing and integrating towards a mainstream market economy with the change in economic intervention, development of education, increasing flow of knowledge system, technological development and others. For example, Sengupta (2013) found that in Tripura, the tribal economy had changed with the initiation and implementation of the government development projects specifically due to the change of cultivation from shifting cultivation to a capital intensive settled cultivation and also due to the increase in the commercialisation of agriculture produce. Moreover, younger generations of people are getting educated and entering into secure government jobs and non-agricultural work. There is also a change in the division of labour from household kin labour, usually in reciprocity, to hired labour. Land and forest are complementary factors of a unified production system (Nongbri, 1999). Most ST people survive on multiple sources of livelihood such as primary sources like small-scale agriculture and secondary sources like horticulture (Nongbri, 1999; Marchang, 2016 & 2019).

In India, historically, the economic activity of most tribes was hunting and food gathering from the forest and subsistence agriculture (MTA, 2013). A large section of the ST population continues to depend on forest produce for various purposes, namely food, fuel and housing material among others. Many STs of the hills of NER continue to depend upon hunting and gathering of forest products from the forest (Gangwar and Ramakrishnan, 1990; Nongbri, 1999). The improvement of their livelihood and economic condition depends on changing the forest-led livelihood source to modern non-agricultural activities. As such, ST unskilled, semi-skilled or skilled workers have increasingly migrated towards urban centres for industrial pursuits and livelihood (Marchang, 2019).

The persistent rise in per capita income in real terms emanating from increased domestic factor productivity without accentuating economic disparities will bring in tribal development in NER (Goswami, 1984). Inappropriate development strategies have not brought any relief to the STs (Sengupta, 1988). Bezbaruah (2007) emphasised that the land reform system would leave to the development of STs in the region. Land tenure for the shifting cultivators needs to be made secure through legislation because most of them do not have a secure land tenure or ownership (Tiwari and Pant, 2019 draft report). Roy (1989) cautions the policymakers of India that many of the tribes in NE India have their counterparts in the adjoining countries. Policy planners in NE India will require awareness and sensitivity about the happenings in the neighbouring countries. Adoption of holistic social and economic development approaches would address the multifaceted developmental issues of STs of the region.

Conclusions

Earlier, the forest land cover in the total geographical area of NER was three times better than that of the rest of India. Similar was the condition for dense forests. Now in NER, reserved forest land has declined, but concurrently, protected forest land has increased. The gradual forest cover improvement is owing to some ST people relinquishing their age-old dependence upon shifting cultivation.

Shifting cultivation is labour intensive and produces subsistence production and income for their livelihood. Forest cover is expected to accelerate further with the effective implementation of the National Forest Policy 2018 to increase forest cover through sustainable forest management; however, the policy does not address the problem of forest rights of marginal and tribal forest dwellers that are otherwise safeguarded by the Forest Right Act (2006) for individual rights over forest land cultivation for livelihoods and community rights over common forest resources. Forest land is largely owned collectively and managed by the community among the STs of the region. Forest land in general and shifting cultivation in particular remains the primary livelihood resource for many ST people. However, the geographical area under shifting cultivation has considerably declined in the region, indicating the abandonment of shifting cultivation by the then shifting cultivators. Forest land cover has slowly increased as the cultivated land under shifting cultivation has declined, despite an increase in the dependence on shifting agriculture; livelihood means have changed from shifting cultivation agriculture to non-agriculture driven by economic and educational development; and afforestation, reforestation and conservation of forest land through community participation and management guided by National Forest Policy. In NER, the land is underutilised for agriculture and securing livelihood as the region contributes only three per cent of India's net area sown or total cropped area against its eight per cent geographical area contribution in the country.

End Notes

[1] Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

[2] Clause (25) of Article 366 of the Constitution of India defined Scheduled Tribes as "such tribes or tribal communities or parts of or groups within such tribes or tribal communities as are deemed under Article 342 to be Scheduled Tribes for the purposes of this constitution" (Chaturvedi, 2007:238; Chandra, 2011).

[3] "[T]ribal communities place little value on surplus accumulation [since] they stress prompt consumption and immediate enjoyment" (Schermerhorn, 1978:71 as cited in Corbridge, 1988:9).

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